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Torimoto

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(54) **TONER CASE AND IMAGE FORMING APPARATUS**

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(51) **Int. Cl.**
G03G 15/08 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 15/0865*** (2013.01); *G03G 2215/0816* (2013.01); *G03G 2215/083* (2013.01)

(58) **Field of Classification Search**
USPC 399/107, 110, 111, 119, 120, 252, 399/258–263
See application file for complete search history.

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(57) **ABSTRACT**

A toner case includes a case main body and an agitating member. The case main body contains a toner. The agitating member agitates the toner contained in the case main body by rotating along an inner surface of the case main body. A rib is protruded on the inner surface of the case main body along a rotation direction of the agitating member. The agitating member is provided with a slit extending along the rotation direction and located at a position corresponding to the rib.

18 Claims, 12 Drawing Sheets

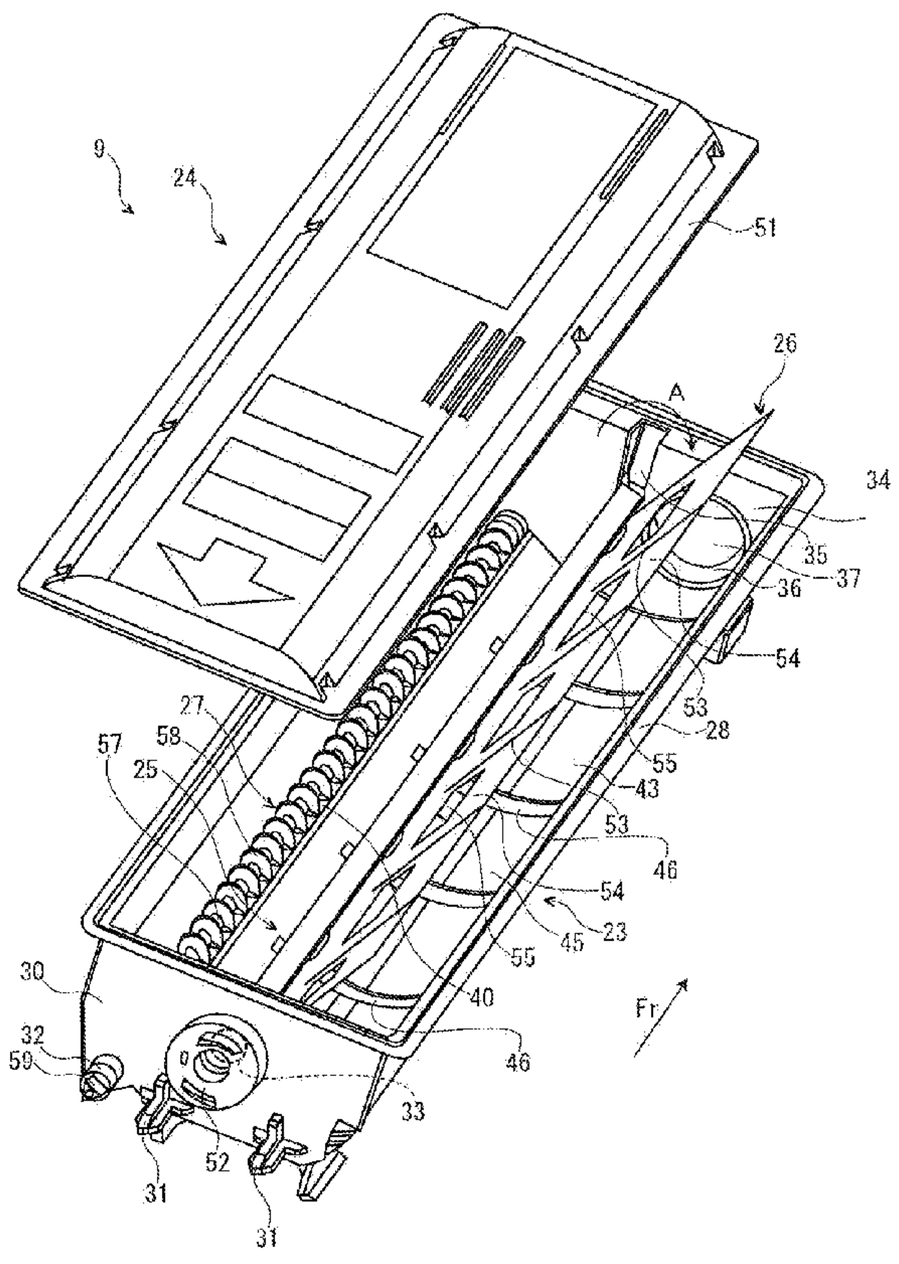

FIG. 1

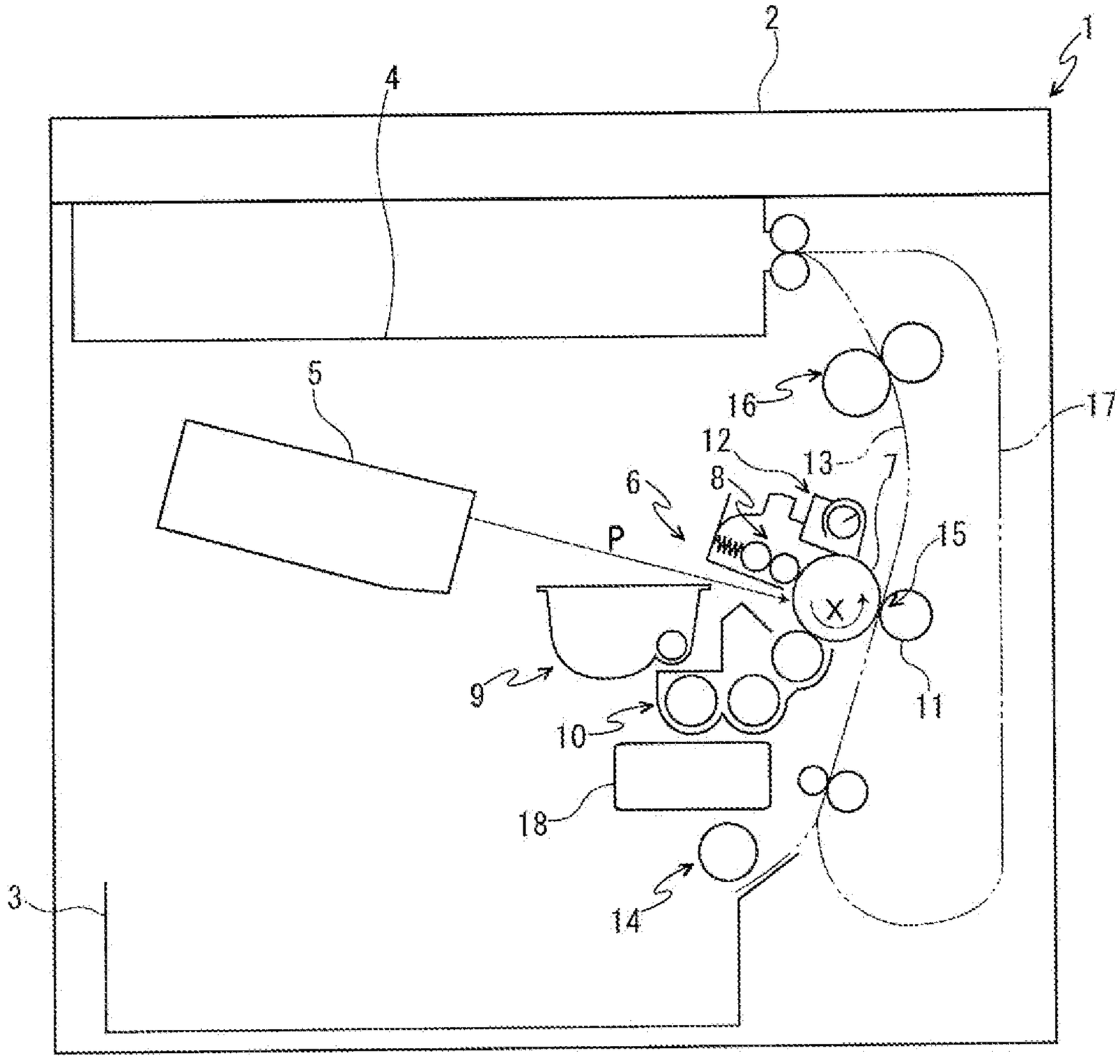

FIG. 2

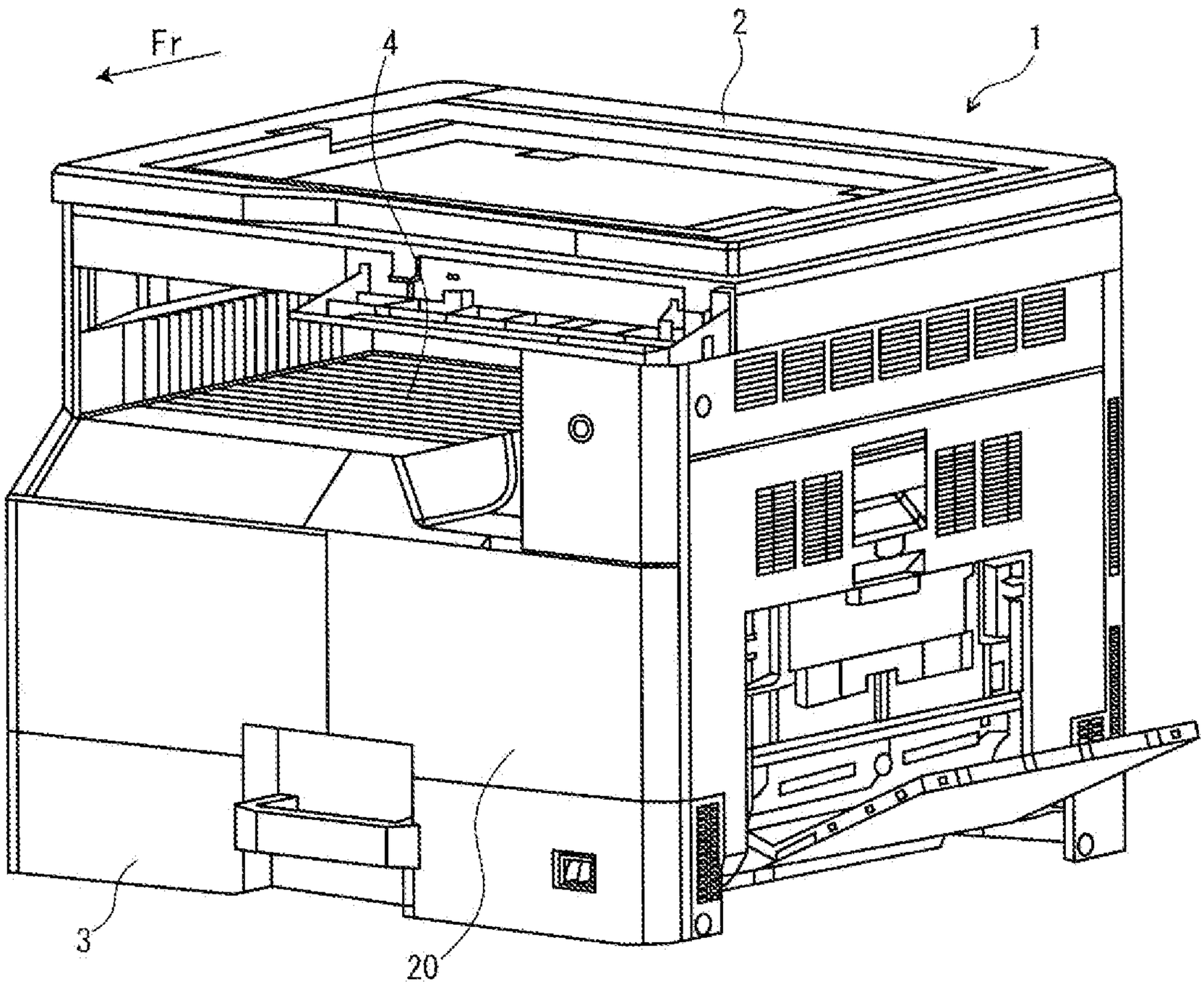

FIG. 3

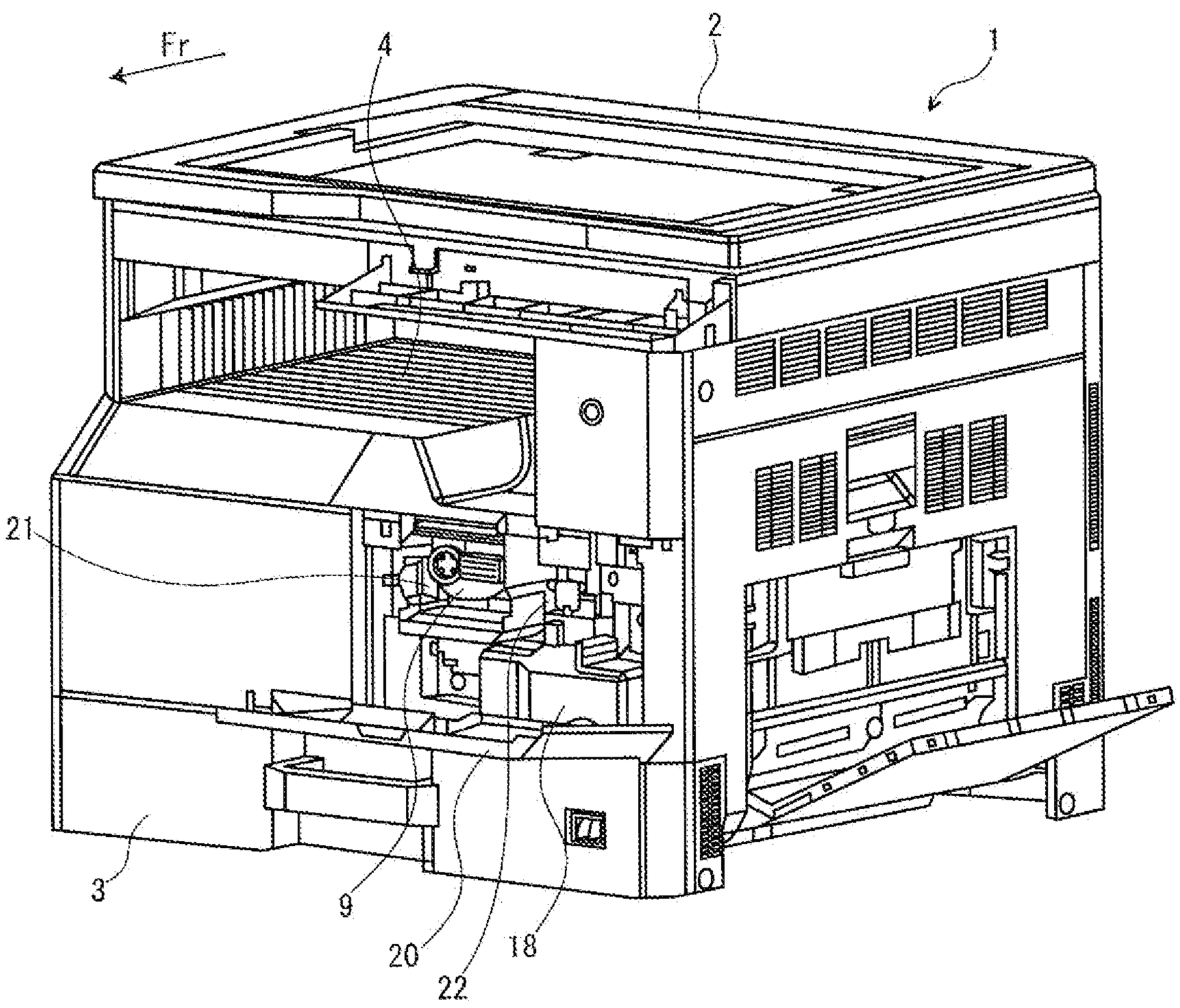

FIG. 4

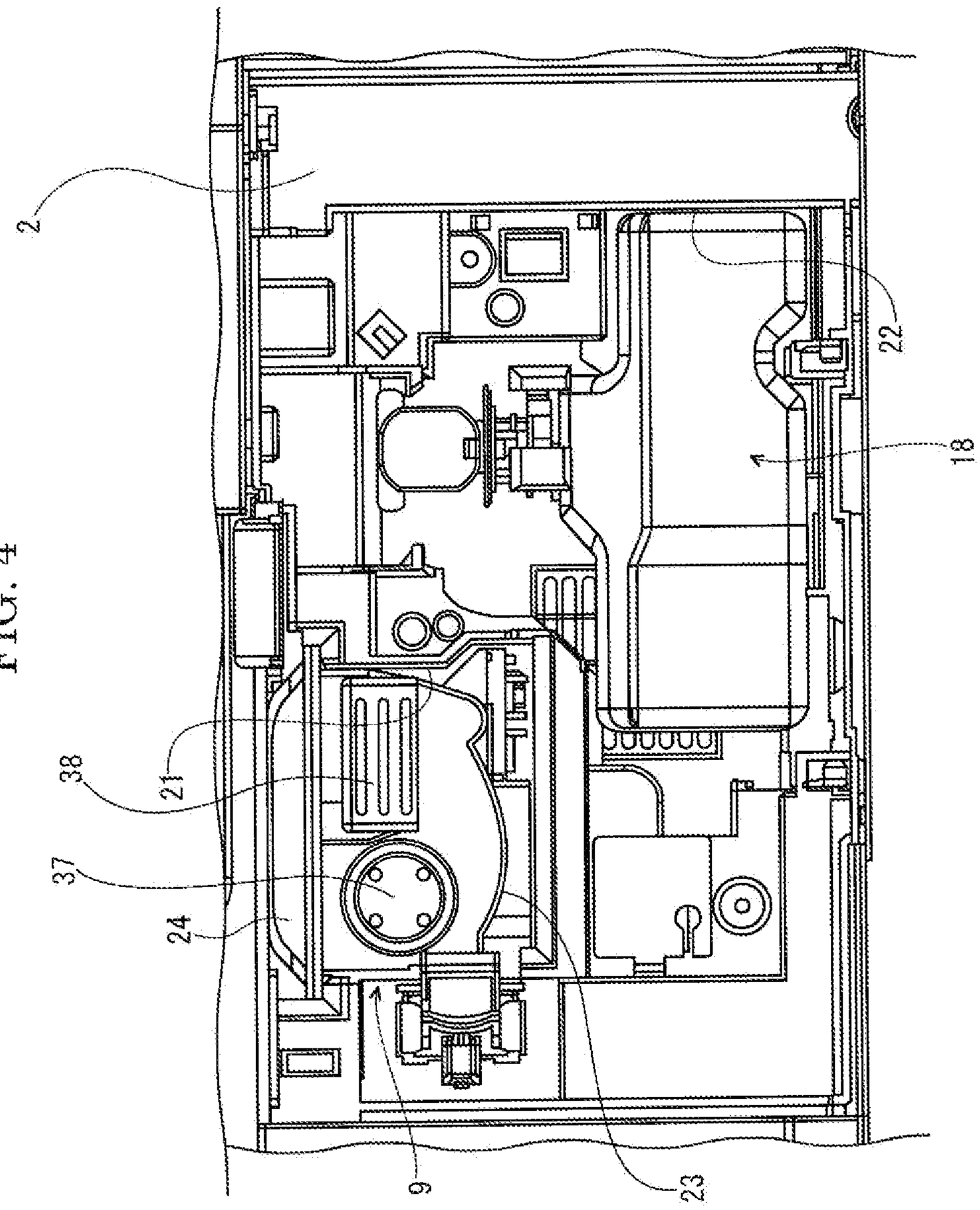

FIG. 5

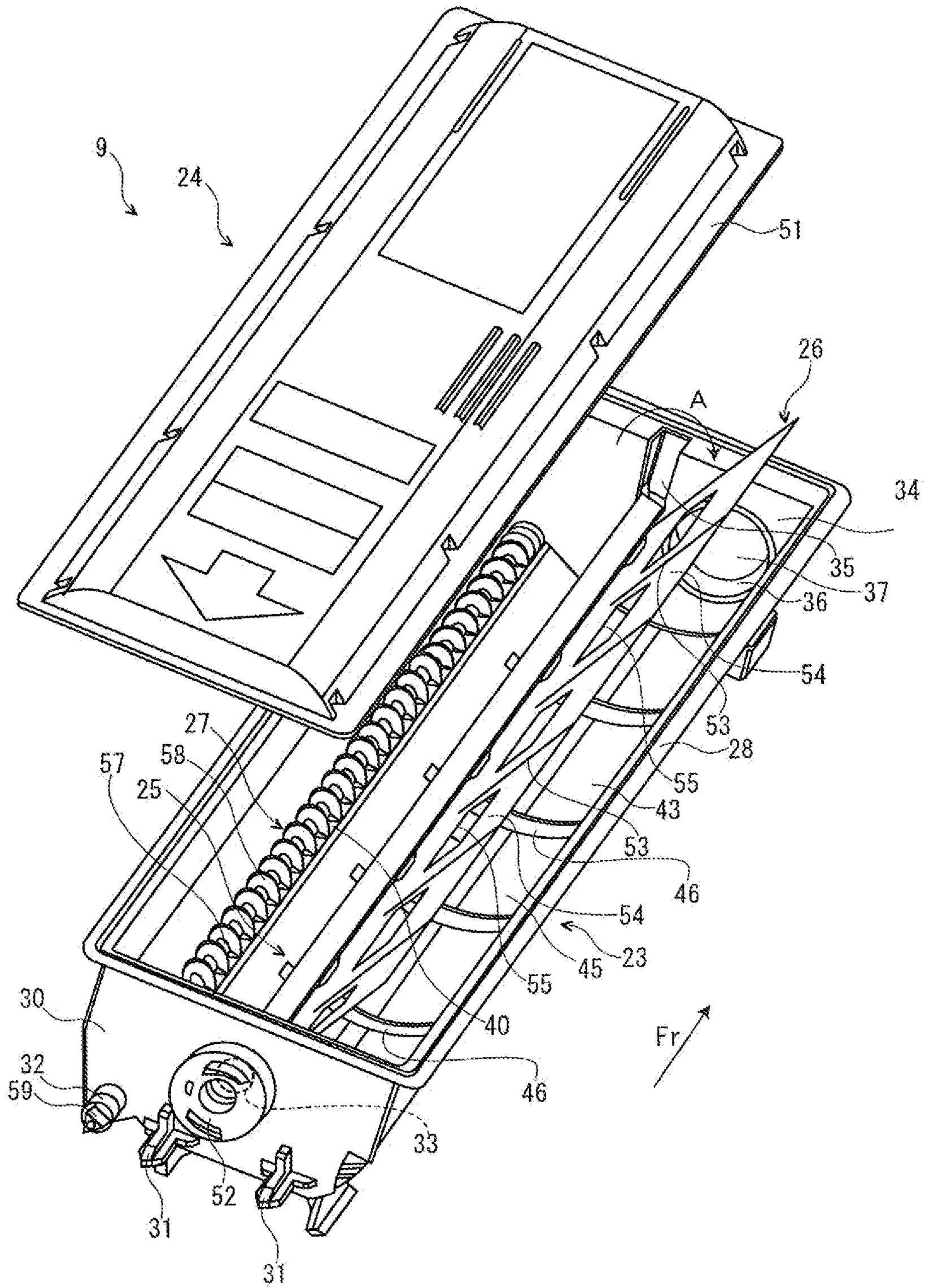
9
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FIG. 6

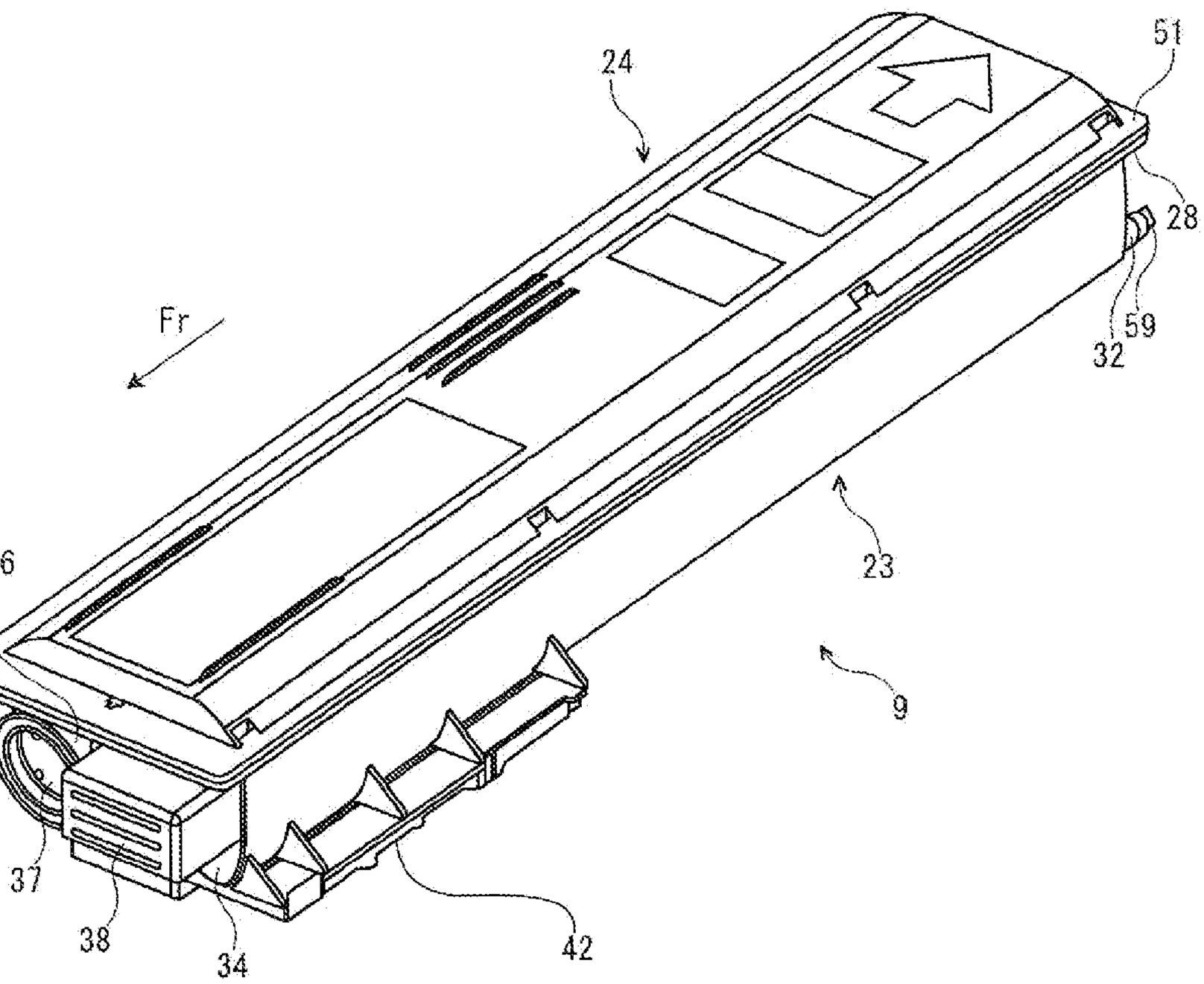
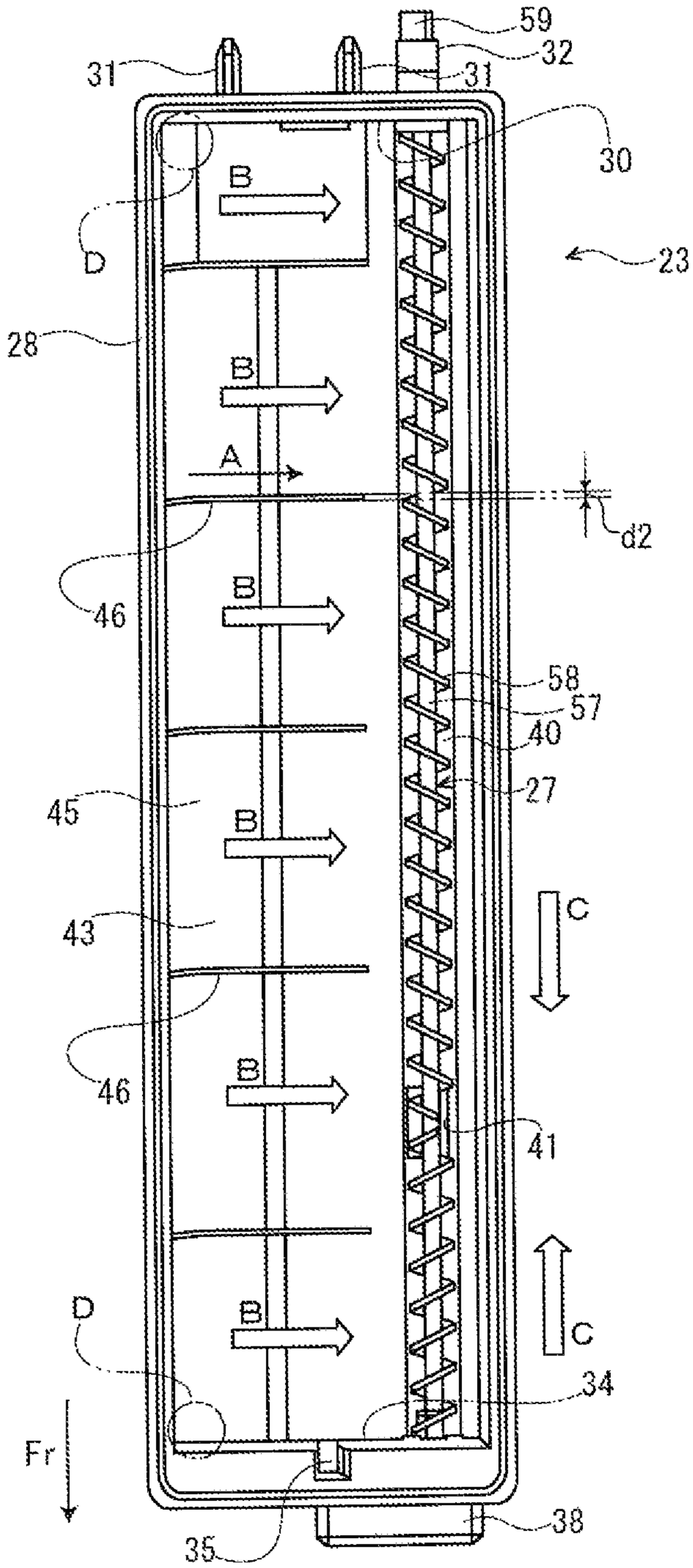


FIG. 7


59
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D
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FIG. 8

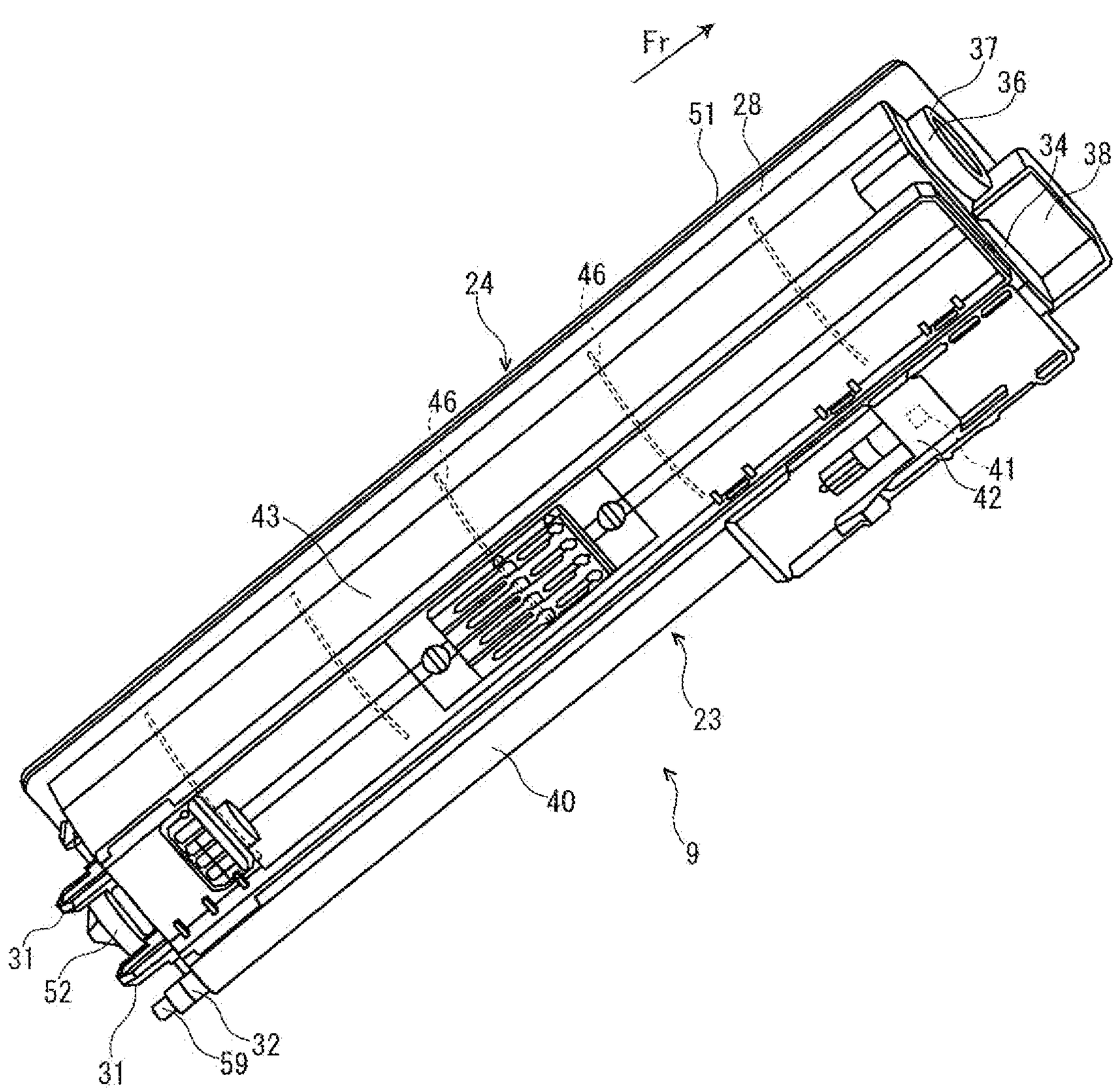


FIG. 9

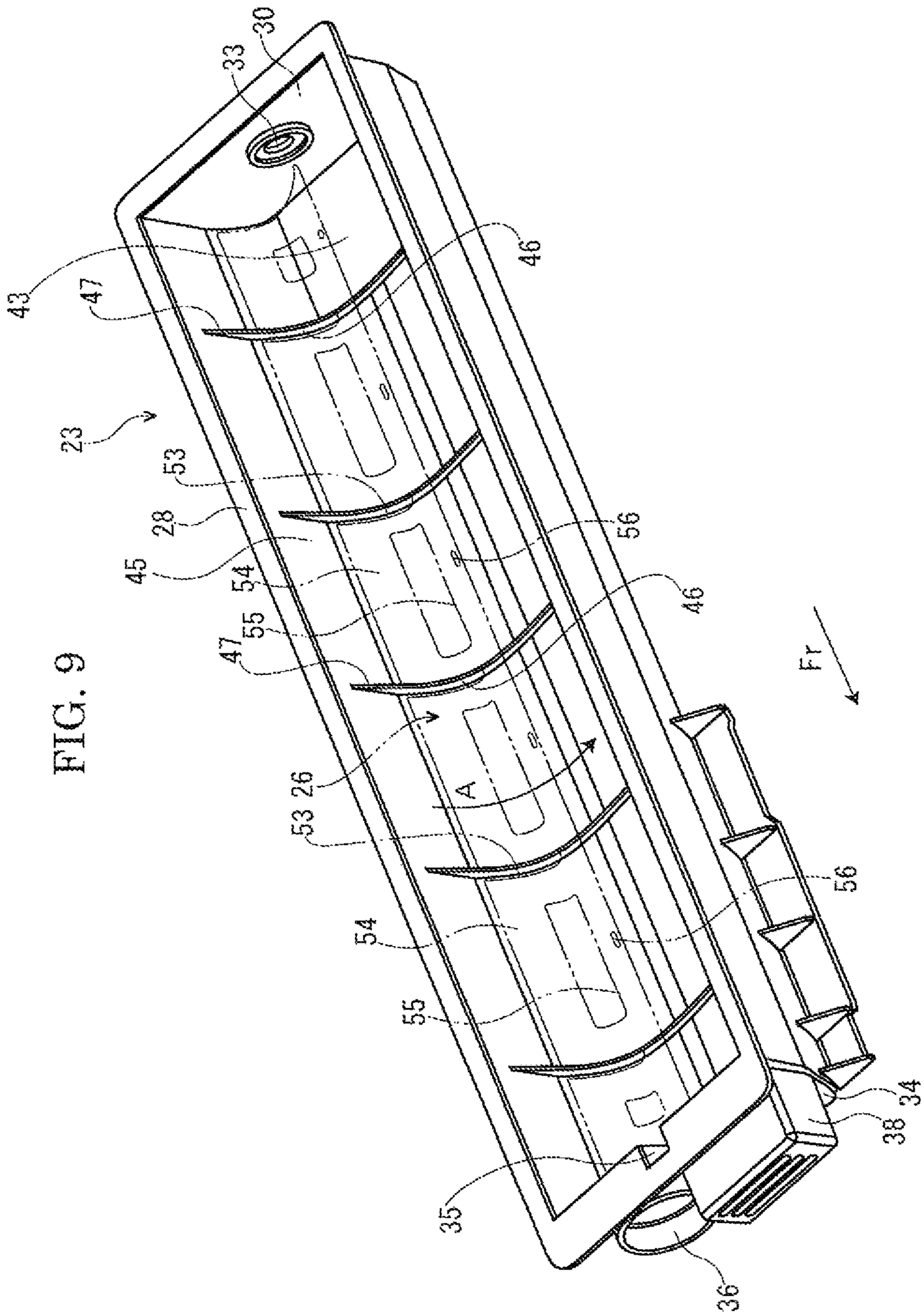


FIG. 10

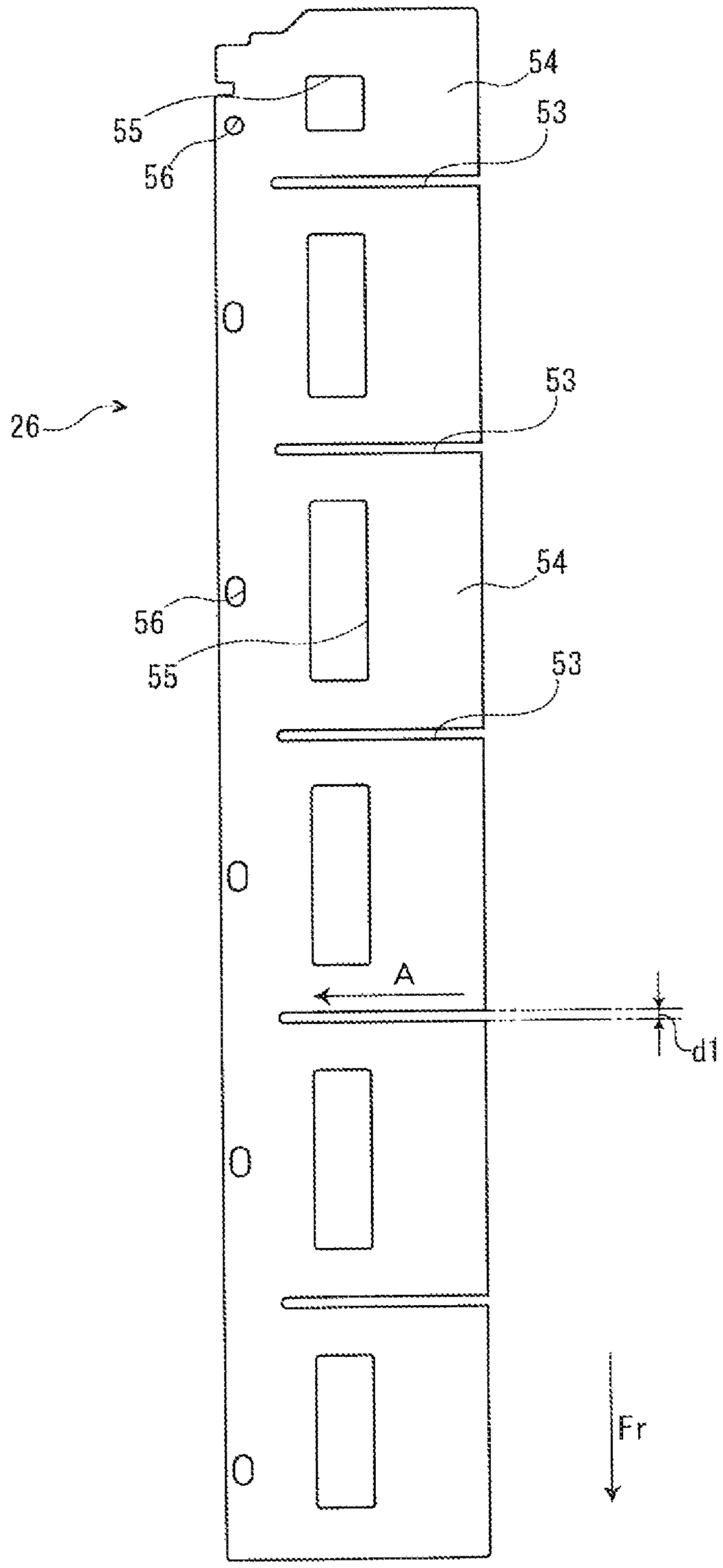


FIG. 11

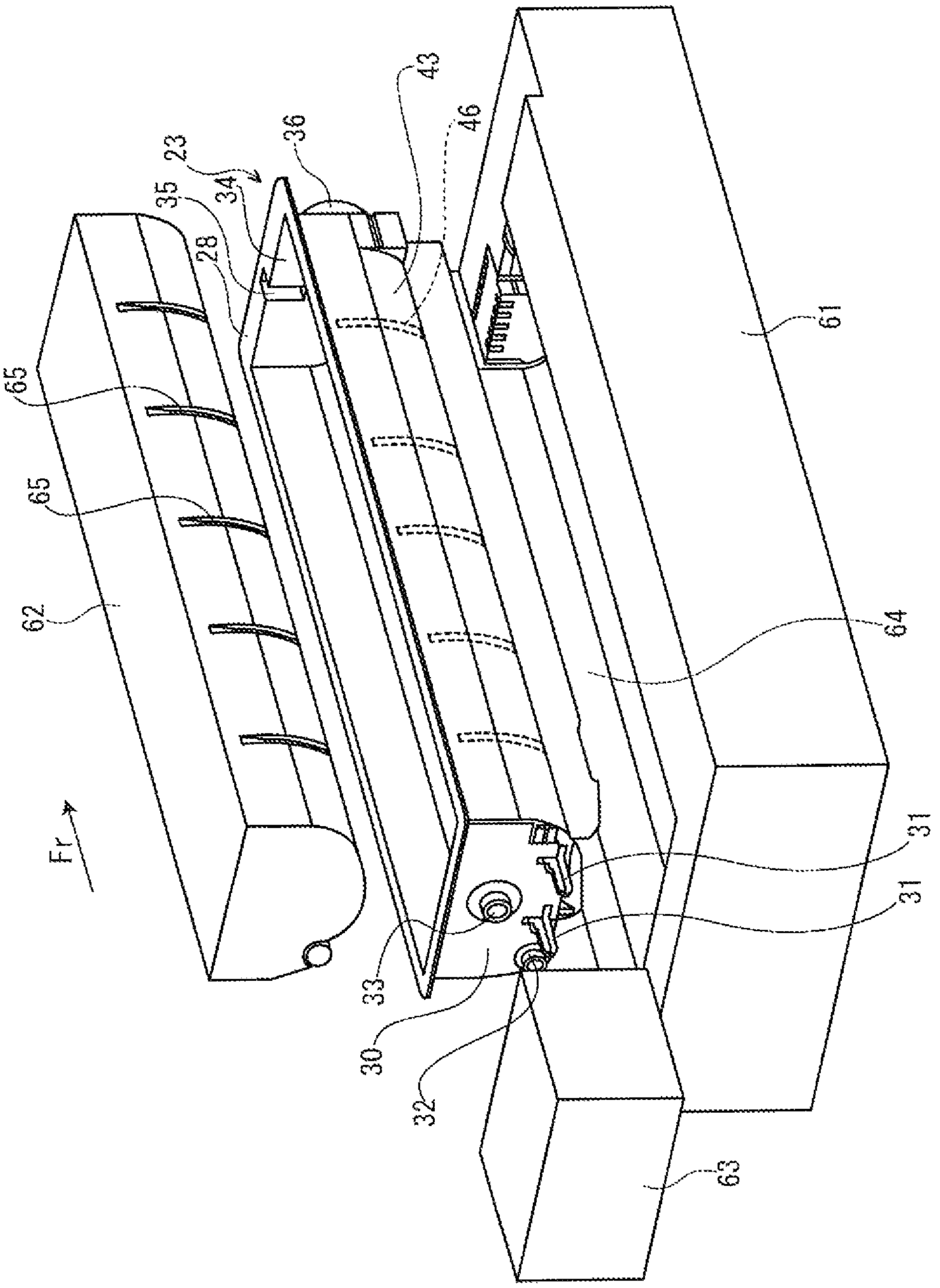
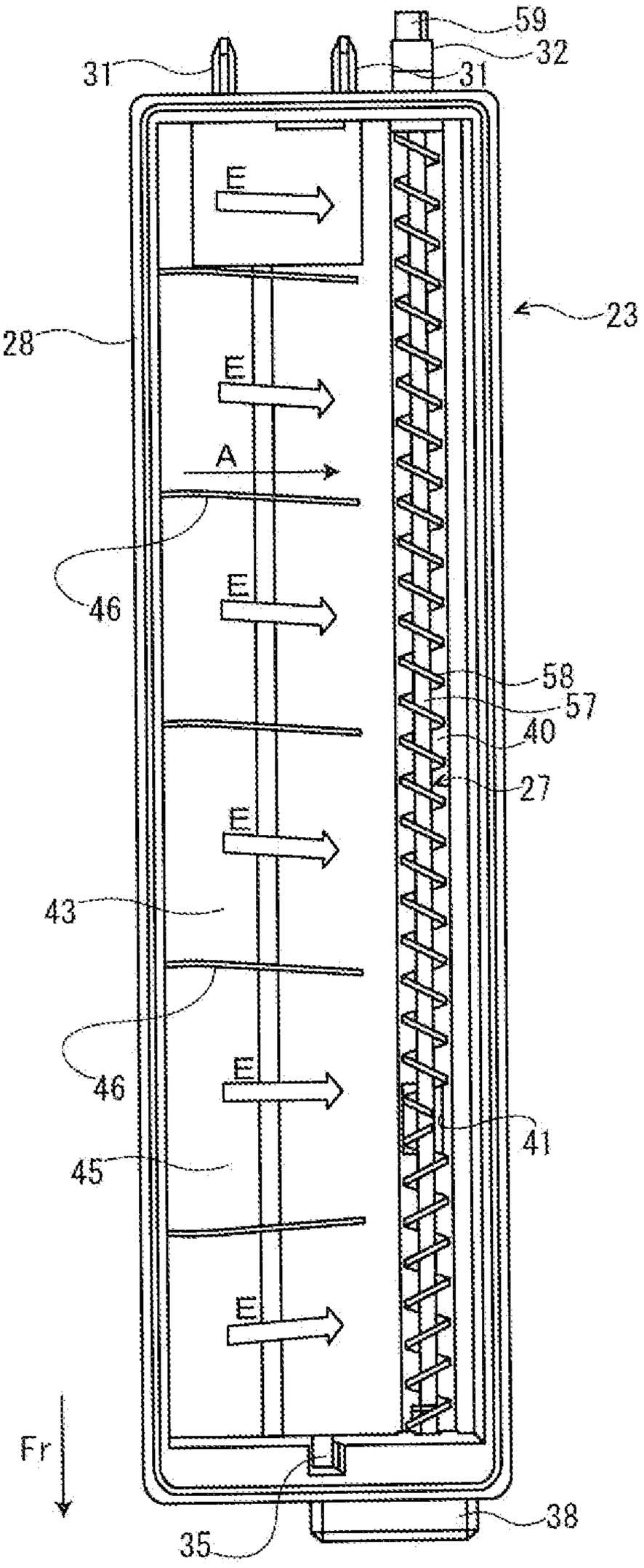


FIG. 12



TONER CASE AND IMAGE FORMING APPARATUS

INCORPORATION BY REFERENCE

This application is based on and claims the benefit of priority from Japanese Patent application No. 2013-038295 filed on Feb. 28, 2013, the entire contents of which are incorporated herein by reference.

BACKGROUND

The present disclosure relates to a toner case and an image forming apparatus provided with the toner case.

An electrographic image forming apparatus carries out the development process by supplying a toner (a developer) from a development device to an electrostatic latent image formed on the surface of a photosensitive drum or the like. The toner used in such development process is supplied from a toner case to the development device.

The aforementioned toner case usually includes a case main body that contains the toner and an agitating member that agitates the toner contained in the case main body by rotating along an inner surface of the case main body. Besides, the agitating member is usually made of a synthetic resin film such as a PET film (polyethylene terephthalate film).

However, if the agitating member is made of a synthetic resin film as described above, the agitating member becomes weak in resilience so that when the agitating member rotates, the rotation track of the agitating member deviates from the designed rotation track. As a result, the agitating member fails to reach a corner part of the case main body, and therefore a large amount of the toner will be left in the toner case (hereinafter, referred to as "used case") having ceased to be of use. Incidentally, this drawback will be improved to some extent if the agitating member is made strong in resilience. However, this will give rise to a new undesired effect that the agitating member produces large noises as it flips on the case main body when the toner in the case main body is nearly run out.

Besides, when the case main body is to be produced, it is a general practice to insert a core (movable mold) into a recess part formed in a cavity (stationary mold) and thus mold the case main body between the cavity and the core. In the case where such a molding method is adopted, it is usually the case that the contact area between the cavity and the case main body is larger than the contact area between the core and the case main body. Due to such a difference of the contact areas, the resistance that occurs when the case main body, after being molded, is released from the molds differs greatly between the cavity side and the core side. Therefore, there occurs a problem that the case main body, after being molded, cannot be released from the cavity, or the molded case main body cannot be easily released from the cavity.

SUMMARY

In accordance with an embodiment of the present disclosure, a toner case includes a case main body and an agitating member. The case main body contains a toner. The agitating member agitates the toner contained in the case main body by rotating along an inner surface of the case main body. A rib is protruded on the inner surface of the case main body along a rotation direction of the agitating member. The agitating member is provided with a slit extending along the rotation direction and located at a position corresponding to the rib.

Furthermore, in accordance with an embodiment of the present disclosure, an image forming apparatus includes a toner case. The toner case includes a case main body and an agitating member. The case main body contains a toner. The agitating member agitates the toner contained in the case main body by rotating along an inner surface of the case main body. A rib is protruded on the inner surface of the case main body along a rotation direction of the agitating member. The agitating member is provided with a slit extending along the rotation direction and located at a position corresponding to the rib.

The above and other objects, features, and advantages of the present disclosure will become more apparent from the following description when taken in conjunction with the accompanying drawings in which a preferred embodiment of the present disclosure is shown by way of illustrative example.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic diagram schematically showing a monochrome printer in accordance with an embodiment of the present disclosure.

FIG. **2** is a right front perspective view showing a situation in which a front cover is closed in the monochrome printer in accordance with the embodiment of the present disclosure.

FIG. **3** is a right front perspective view showing a situation in which the front cover is opened in the monochrome printer in accordance with the embodiment of the present disclosure.

FIG. **4** is a front view showing a toner container, a waste toner bottle, and their surroundings in the monochrome printer in accordance with the embodiment of the present disclosure.

FIG. **5** is a rear upper perspective view of the toner container with a case main body and a lid body separated from each other in the monochrome printer in accordance with the embodiment of the present disclosure.

FIG. **6** is a right upper perspective view showing the toner container in the monochrome printer in accordance with the embodiment of the present disclosure.

FIG. **7** is a plan view showing the case main body and a conveying screw of the toner container in the monochrome printer in accordance with the embodiment of the present disclosure.

FIG. **8** is a lower perspective view showing the toner container in the monochrome printer in accordance with the embodiment of the present disclosure.

FIG. **9** is a right upper perspective view showing the case main body of the toner container in the monochrome printer in accordance with the embodiment of the present disclosure.

FIG. **10** is a plan view showing an agitating paddle of the toner container in the monochrome printer in accordance with the embodiment of the present disclosure.

FIG. **11** is a left rear perspective view showing molds for molding the case main body of the toner container in the monochrome printer in accordance with the embodiment of the present disclosure.

FIG. **12** is a plan view showing a case main body and a conveying screw of a toner container in a monochrome printer in accordance with another embodiment of the present disclosure.

DETAILED DESCRIPTION

First, with reference to FIG. **1**, the whole structure of a monochrome printer **1** (an image forming apparatus) will be described. FIG. **1** is a schematic diagram schematically show-

ing the monochrome printer **1** in accordance with an embodiment of the present disclosure.

The monochrome printer **1** includes a box-formed printer main body **2**. In a lower part of the printer main body **2**, a sheet feeding cartridge **3** storing sheets (not shown) is installed and, in an upper part of the printer main body **2**, a sheet ejecting tray **4** is formed.

In a left part of the printer main body **2**, an exposure device **5** composed of a laser scanning unit (LSU) is installed. In a right part of the printer main body **2**, an image forming part **6** is arranged. In the image forming part **6**, a photosensitive drum **7** as an image carrier is rotatably installed. Around the photosensitive drum **7**, a charging device **8**, a development device **10** connected to a toner container **9** (toner case), a transferring roller **11**, and a cleaning device **12** are located along a rotating direction (refer to an arrow X in FIG. **1**) of the photosensitive drum **7**. In the right lower side of the toner container **9**, a waste toner bottle **18** is arranged.

In the right part of the printer main body **2**, a sheet conveying path **13** is arranged from a lower side to an upper side. At an upstream end in the conveying path **13**, a sheet feeder **14** is positioned. At an intermediate stream part in the conveying path **13**, a transferring part **15** composed of the photosensitive drum **7** and transferring roller **11** is positioned. At a downstream part in the conveying path **13**, a fixing device **16** is positioned. In the right side of the conveying path **13**, an inversion path **17** for duplex printing is arranged.

Next, the operation of forming an image by the monochrome printer **1** having such a configuration will be described.

When the power is supplied to the monochrome printer **1**, various parameters are initialized and initial determination, such as temperature determination of the fixing device **16**, is carried out. Subsequently, in the monochrome printer **1**, when image data is inputted and a printing start is directed from a computer or the like connected with the monochrome printer **1**, image forming operation is carried out as follows.

First, the surface of the photosensitive drum **7** is uniformly electric-charged by the charging device **8**. Then, exposure corresponding to the image data on the photosensitive drum **7** is carried out by a laser light (refer to an arrow P in FIG. **1**) from the exposure device **5**, thereby forming an electrostatic latent image on the surface of the photosensitive drum **7**. Subsequently, the development device **10** develops the electrostatic latent image by a toner (a developer) supplied from the toner container **9**.

On the other hand, the sheet fed from the sheet feeding cartridge **3** by the sheet feeder **14** is conveyed to the transferring part **15** in a suitable timing for the above-mentioned image forming operation. Then, the toner image carried on the photosensitive drum **7** is transferred onto the sheet at the transferring partly. The sheet with the transferred toner image is conveyed to a downstream side in the conveying path **13** to go forward to the fixing device **16**, and then, the toner image is fixed on the sheet in the fixing device **16**. The sheet with the fixed toner image is ejected from a downstream end in the conveying path **13** to the sheet ejecting tray **4**. The toner remained on the photosensitive drum **7** is removed by the cleaning device **12** and stored in the waste toner bottle **18**.

Next, using FIG. **2** to FIG. **4**, the printer main body **2** will be described further in detail. Incidentally, an arrow Fr in FIG. **2** and FIG. **3** indicates a front side of the monochrome printer **1** (the same applies to FIG. **5** and the subsequent drawings).

As shown in FIG. **2** and FIG. **3**, a front cover **20** is attached to a right side part of a front surface of the printer main body **2**. The front cover **20** is located above the sheet feeding cartridge **3** and below the sheet ejecting tray **4**. The front cover **20** is constructed so as to open and close by rotating with a lower end side being a support point.

As shown in FIG. **3** and FIG. **4**, a container attachment part **21** is formed in a portion of the printer main body **2** which is covered by the front cover **20** (not shown in FIG. **4**). The toner container **9** (described in detail later) is detachably attached to the container attachment part **21**, and the toner container **9** can be removed from the container attachment part **21** by opening the front cover **20**.

A bottle attachment part **22** is formed in a portion of the printer main body **2** which is covered by the front cover **20**. The bottle attachment part **22** is located at a right lower side of the container attachment part **21**. The waste toner bottle **18** is detachably attached to the bottle attachment part **22**, and the waste toner bottle **18** can be removed from the bottle attachment part **22** by opening the front cover **20**.

Next, using FIG. **5** to FIG. **10**, the toner container **9** will be described in detail. Incidentally, since FIG. **5** is a rear upper perspective view, the left and right positional relation in the drawing is opposite to the actual left and right positional relation. Besides, an arrow A provided in drawings indicates the counterclockwise direction in a front view (the clockwise direction in a back view). Hereinafter, this direction will be called as a rotation direction A.

As shown in FIG. **5**, the toner container **9** includes a case main body **23** having a box shape with an open upper surface, a lid body **24** that covers the upper surface of the case main body **23**, an attachment frame **25** (attachment member) housed in a substantially middle part of the case main body **23**, an agitating paddle **26** (agitating member) attached to the attachment frame **25**, and a conveying screw **27** (conveying member) housed in a lower right part of the case main body **23** (a lower left part in the drawing of FIG. **5**).

Firstly, the case main body **23** will be described. The case main body **23** contains the toner. The case main body **23** is made of, for example, resin, and has an elongated shape in a front and rear direction. An upper end outer periphery of the case main body **23** is provided with a main body side flange part **28**. A pair of left and right mounting protrusions **31** are protruded rearward from a lower end part of a rear end wall **30** of the case main body **23**. A cylindrical penetrating tubular part **32** is provided in a lower right portion of the rear end wall **30** of the case main body **23** (a lower left portion in the drawing of FIG. **5**). A substantially central portion of the rear end wall **30** of the case main body **23** is provided with a penetrating hole **33**.

A rear surface (inner surface) of a front end wall **34** of the case main body **23** is provided with an engagement groove **35** formed at a middle position in the left and right direction. The engagement groove **35** extends from an upper end part of the front end wall **34** to a middle part thereof in an up and down direction. As shown in FIG. **6**, a left side part of the front end wall **34** of the case main body **23** is provided with a filling opening **36** for filling the inside of the case main body **23** with the toner. The filling opening **36** is closed by a cap **37**. A right side portion of the front end wall **34** of the case main body **23** is provided with a handle **38** protruded forward.

As shown in FIG. **7**, a right side portion of the case main body **23** is provided with a discharge duct part **40**. The discharge duct part **40** is curved downward in an arc shape. A front part of the discharge duct part **40** is provided with a discharge port **41** for discharging the toner from the case main body **23**. As shown in FIG. **8**, a lower side of the discharge port **41** is covered with a shutter **42** that is capable of opening or closing the discharge port **41**.

As shown in FIG. **7**, in the case main body **23**, a toner containing part **43** is formed at the left side of the discharge

duct part **40**. As shown in FIG. **9**, the toner containing part **43** is curved leftward and downward in an arc shape.

On an inner surface **45** of the toner containing part **43**, a plurality of (five in this embodiment) ribs **46** are protruded along the rotation direction A. In this embodiment, the ribs **46** are provided in parallel with the rotation direction A. The ribs **46** are disposed at intervals in the front and rear direction. Incidentally, as shown in FIG. **8**, on an outer surface of the toner containing part **43**, portions that correspond to the ribs **46** are not hollowed inward.

As shown in FIG. **9**, each rib **46** is curved in the arc shape along the shape of the toner containing part **43**. An upstream end part of each rib **46** in the rotation direction A is provided with a guide part **47**. The guide part **47** has a tapered shape, that is, a protruded height of the guide part **47** from the inner surface **45** of the toner containing part **43** gets smaller toward the upstream side in the rotation direction A.

Next, the lid body **24** will be described. As shown in FIG. **5** and the like, the lid body **24** has a rectangular shape elongated in the front and rear direction. An outer periphery of the lid body **24** is provided with a lid body side flange part **51** that corresponds in shape to the main body side flange part **28** of the case main body **23**. The main body side flange part **28** and the lid body side flange part **51** are ultrasonically fused so that the case main body **23** and the lid body **24** are consolidated (see FIG. **6**).

Next, the attachment frame **25** will be described. As shown in FIG. **5**, the attachment frame **25** has a frame platy shape elongated in the front and rear direction. A front end part of the attachment frame **25** is engaged with the engagement groove **35** formed in the front end wall **34** of the case main body **23**. A rear side part of the attachment frame **25** penetrates through the penetrating hole **33** that is formed in the rear end wall **30** of the case main body **23**. Due to this construction, the attachment frame **25** is rotatably supported by the case main body **23**. A rear end part of the attachment frame **25** is protruded from the rear end wall **30** of the case main body **23** to the rear side (outer side) of the rear end wall **30**. A first drive coupling **52** is fixed to this protruded portion of the attachment frame **25**.

Next, the agitating paddle **26** will be described. The agitating paddle **26** is made of, for example, a synthetic resin film, such as a PET film (polyethylene terephtahlate film), and has flexibility. For the agitating paddle **26**, for example, Lumirror may be used.

As shown in FIG. **10**, the agitating paddle **26** has an elongated shape in the front and rear direction. The agitating paddle **26** is provided with a plurality of (five in this embodiment) slits extending along the rotation direction A. In this embodiment, the slits **53** are formed in parallel with the rotation direction A. The slits **53** extend from one end part of the agitating paddle **26** in its width direction (a right end part in the drawing of FIG. **10**) to one side part opposite to the one end part in the width direction (a left side part in the drawing of FIG. **10**). The slits **53** are located at positions in the front and rear direction which correspond to the ribs **46** provided on the case main body **23**. A front and rear width d1 of each slit **53** (see FIG. **10**) is larger than a front and rear width d2 of each rib **46** (see FIG. **7**).

As shown in FIG. **10**, the agitating paddle **26** is provided with a plurality of (six in this embodiment) tongue pieces **54** that are divided by the slits **53**. The tongue piece **54** located at rear end is smaller in the front and rear width than the other tongue pieces **54**. Each of the tongue pieces **54** is provided with a quadrangular window part **55**. The other end part of the agitating paddle **26** in the width direction (the left end part in the drawing of FIG. **10**) is provided with attachment holes **56** that are formed at positions that correspond to the tongue pieces **54**. The attachment holes **56** are provided at intervals in the front and rear direction. Then, by engaging the attachment holes **56** with six attachment parts (not shown) provided on the attachment frame **25**, the other end part of the agitating paddle **26** in the width direction is attached to the attachment frame **25** along the front and rear direction (see FIG. **5**).

Next, the conveying screw **27** will be described. As shown in FIG. **7**, the conveying screw **27** has an elongated shape in the front and rear direction. The conveying screw **27** is provided with a rod-shaped rotating shaft **57** and a helical fin **58** provided coaxially on an outer periphery of the rotating shaft **57**.

The rotating shaft **57** has an elongated shape in the front and rear direction. From a front end part to a rear part of the rotating shaft **57** is housed in the discharge duct part **40** of the case main body **23**. The front end part of the rotating shaft **57** is supported by the front end wall **34** of the case main body **23**, and a rear side part of the rotating shaft **57** penetrates through the penetrating tubular part **32** of the rear end wall **30** of the case main body **23**. Due to this construction, the conveying screw **27** is rotatably supported by the case main body **23**. A rear end part of the rotating shaft **57** is protruded from the rear end wall **30** of the case main body **23** to the rear side (outer side) of the rear end wall **30**. A second drive coupling **59** is fixed to this protruded portion of the rotating shaft **57**.

The fin **58** is housed in the discharge duct part **40** of the case main body **23**. The helical direction of a portion of the fin **58** located forward of the discharge port **41** and the helical direction of a portion thereof located rearward of the discharge port **41** are opposite to each other.

With regard to the toner container **9** constructed as described above, an operation performed when toner is discharged from the case main body **23** will be described.

When the toner container **9** is attached to the container attachment part **21** of the printer main body **2**, the shutter **42** moves from a position at which the shutter **42** closes the discharge port **41** to a position at which the shutter **42** opens the discharge port **41**. In such a situation, when the first drive coupling **52** is rotated by a drive source such as an electric motor (not shown), the rotation thereof is transmitted to the attachment frame **25**, so that the attachment frame **25** rotates in the rotation direction A. In connection with this rotation, the agitating paddle **26** attached to the attachment frame **25** rotates in the rotation direction A together with the attachment frame **25**. At that time, the agitating paddle **26** rotates along the inner surface **45** of the toner containing part **43** of the case main body **23** while frictionally sliding on the inner surface **45**, whereby the toner contained in the toner containing part **43** of the case main body **23** is agitated. In connection with this agitation, the toner contained in the toner containing part **43** of the case main body **23** moves toward the discharge duct part **40** as indicated by arrows B in FIG. **7**.

Besides, when the second drive coupling **59** is rotated by the aforementioned drive source (not shown), the rotation thereof is transmitted to the conveying screw **27**, so that the conveying screw **27** rotates. As the conveying screw **27** rotates in this manner, the toner having flown into the discharge duct part **40** is conveyed toward the discharge port **41** as indicated by arrows C in FIG. **7**. The toner conveyed toward the discharge port **41** in this manner is discharged from the case main body **23** through the discharge port **41**, and is supplied to the development device **10**.

The provision of the agitating paddle **26** in the toner container **9** as described above makes it possible to scrape and gather the toner in the toner containing part **43** to the discharge duct part **40**. Therefore, the amount of the toner left in

the toner containing part **43** can be reduced in comparison with the case where the toner container **9** is provided merely with the conveying screw **27**, not with an agitating paddle. However, since the agitating paddle **26** is made of a synthetic resin film as described above, there is risk that when the agitating paddle **26** rotates, the agitating paddle **26** may deform and the rotation track of the agitating paddle **26** may deviate from the designed rotation track. If the rotation track of the agitating paddle **26** thus deviates, the agitating paddle **26** may fail to reach corner parts of the case main body **23** (e.g., a portion D in FIG. **7**), and therefore there is risk that the toner is left in the corner parts of the case main body **23**.

However, in this embodiment, a plurality of the ribs **46** are protruded on the inner surface **45** of the toner containing part **43** of the case main body **23** along the rotation direction A of the agitating paddle **26**. Therefore, the ribs **46** guide the agitating paddle **26** along the rotation direction A, so that the rotation track of the agitating paddle **26** can be corrected. In connection with this, it becomes possible to make the agitating paddle **26** reach the corner parts of the case main body **23**, and it becomes possible to enhance the agitating performance of the agitating paddle **26**. Therefore, the toner inside the case main body **23** can be consumed as thoroughly as possible, and the amount of the toner left in the used case can be reduced.

Besides, since the ribs **46** are provided in parallel with the rotation direction A, it becomes possible to certainly guide the agitating paddle **26** along the rotation direction A. Besides, since the upstream end part of each rib **46** in the rotation direction A is provided with the guide part **47**, the agitating paddle **26** can be prevented from being caught by a rib **46** and therefore the agitating paddle **26** can be smoothly rotated.

Besides, the agitating paddle **26** is provided with the slits **53** that are located at positions corresponding to the ribs **46** and that extend along the rotation direction A (see FIG. **9**). Therefore, it becomes possible to enhance the function of the ribs **46** guiding the agitating paddle **26**, and the agitating paddle **26** can be more certainly made to reach the corner parts of the case main body **23**.

Besides, since the agitating paddle **26** is attached to the attachment frame **25** and rotates together with the attachment frame **25**, it becomes possible to certainly rotate the agitating paddle **26**. Besides, the agitating paddle **26** is made of a synthetic resin film, and has flexibility. Therefore, the agitating paddle **26** more easily follows the shape of the inner surface **45** of the toner containing part **43** of the case main body **23**.

Next, a method of producing the case main body **23** of the toner container **9** constructed as described above will be described using FIG. **11**.

A mold for molding the case main body **23** is composed of a cavity **61**, a core **62** disposed on an upper side of the cavity **61**, and a slide **63** disposed at a rear side of the cavity **61**.

The cavity **61** is a stationary mold. The cavity **61** is provided with a recess part **64** whose upper surface is open. The core **62** is provided so as to be capable of being raised and lowered relative to the cavity **61**. On an outer peripheral surface of the core **62**, a plurality of (five in this embodiment) groove parts **65** for molding the ribs **46** of the case main body **23** are formed at intervals in the front and rear direction. The slide **63** is provided so as to be slidable in the front and rear direction relative to the cavity **61**, and the rear surface side of the rear end wall **30** of the case main body **23** can be molded by the slide **63**.

To produce the case main body **23** of the toner container **9** constructed as described above, the core **62** is inserted into the recess part **64** of the cavity **61**, and then the case main body **23** is molded between the cavity **61** and the core **62**. In this case, the contact area between the cavity **61** and the case main body **23** is usually larger than the contact area between the core **62** and the case main body **23**. Due to such a difference of the contact areas, the resistance that occurs when the case main body **23**, after being molded, is released from the molds differs greatly between the cavity **61** side and the core **62** side. Therefore, there occurs a problem that the case main body **23**, after being molded, cannot be released from the cavity **61**, or the molded case main body **23** cannot easily be released from the cavity **61**.

However, in this embodiment, the groove parts **65** for molding the ribs **46** of the case main body **23** are formed in the outer peripheral surface of the core **62**. In connection with this, the contact area between the core **62** and the case main body **23** becomes larger. Therefore, it becomes possible to bring the contact area between the core **62** and the case main body **23** closer to the contact area between the cavity **61** and the case main body **23**. Therefore, it becomes possible to prevent a situation in which, because the contact area between the core **62** and the case main body **23** and the contact area between the cavity **61** and the case main body **23** are different, mold release failure occurs or release of the molded case main body **23** from the cavity **61** becomes difficult. In connection with this, it becomes possible to improve the work efficiency in the production of the case main body **23**.

In the embodiment, the ribs **46** of the case main body **23** are provided in parallel with the rotation direction A. However, in another embodiment, as shown in FIG. **12**, ribs **46** may be inclined to the discharge port **41** side toward a downstream side in the rotation direction A. Adoption of this construction allows the toner contained in the toner containing part **43** of the case main body **23** to be moved toward the discharge port **41** side by the agitating paddle **26** (see arrows E in FIG. **12**). Therefore, the toner discharging performance can be enhanced.

Besides, in another embodiment, ribs **46** may be inclined to a central part of the case main body **23** in the longitudinal direction of the case main body **23** toward a downstream side in the rotation direction A. Adoption of this construction makes it possible for the agitating paddle **26** to gather the toner toward the central part of the case main body **23** in the longitudinal direction, so that the amount of toner left in two end portions of the case main body **23** in the longitudinal direction can be reduced.

As is apparent from the foregoing description, being "along the rotation direction A of the agitating paddle **26**" does not only cover the situation that the ribs **46** are parallel with the rotation direction A of the agitating paddle **26**, but also covers the situation that the ribs **46** are inclined to the rotation direction A of the agitating paddle **26** within such a range that the ribs extend along the rotation direction A of the agitating paddle **26**.

Although in the embodiment, the construction of the present disclosure is applied to the toner container **9**, the construction of the present disclosure may also be applied to a toner case interposed between the toner container **9** and the development device **10** (a generally termed "intermediate hopper") in another embodiment.

Although the embodiment was described in a case where ideas of the disclosure are applied to the monochrome printer **1**, as a furthermore embodiment, the ideas of the disclosure may be applied to another image forming apparatus such as a color printer, a copying machine, a facsimile or a multifunction peripheral.

While the present disclosure has been described with reference to the particular illustrative embodiments, it is not to be restricted by the embodiments. It is to be appreciated that

those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present disclosure.

What is claimed is:

1. A toner case comprising:

a case main body configured to contain a toner; and

an agitating member configured to agitate the toner contained in the case main body by rotating along an inner surface of the case main body, wherein

a rib is protruded on the inner surface of the case main body along a rotation direction of the agitating member, and

the agitating member is provided with a slit extending along the rotation direction and located at a position corresponding to the rib.

2. The toner case according to claim **1**, wherein the rib is provided in parallel with the rotation direction.

3. The toner case according to claim **1**, wherein the case main body includes a discharge port discharging the toner, and

the rib is inclined to the discharge port side toward a downstream side in the rotation direction.

4. The toner case according to claim **1**, wherein an upstream end part of the rib in the rotation direction is provided with a guide part, and protruded height of the guide part from the inner surface of the case main body gets smaller toward an upstream side in the rotation direction.

5. The toner case according to claim **1**, further comprising an attachment member rotatably supported by the case main body, wherein

the agitating member is configured to be attached to the attachment member and rotate together with the attachment member.

6. The toner case according to claim **1**, wherein the agitating member is made of a synthetic resin film, and has flexibility.

7. The toner case according to claim **1**, wherein a width of the slit is larger than a width of the rib.

8. The toner case according to claim **1**, wherein the slit extends from one end part of the agitating member in a width direction to one side part opposite to the one end part of the agitating member in the width direction.

9. The toner case according to claim **1**, further comprising a conveying member rotatably supported by the case main body, wherein

the case main body includes:

a discharge duct part in which the conveying member is housed; and

a toner containing part on which the agitating member frictionally slides, and

the rib is provided on the toner containing part.

10. An image forming apparatus comprising:

a toner case configured to include:

a case main body configured to contain a toner; and

an agitating member configured to agitate the toner contained in the case main body by rotating along an inner surface of the case main body, wherein

a rib is protruded on the inner surface of the case main body along a rotation direction of the agitating member, and

the agitating member is provided with a slit extending along the rotation direction and located at a position corresponding to the rib.

11. The image forming apparatus according to claim **10**, wherein the rib is provided in parallel with the rotation direction.

12. The image forming apparatus according to claim **10**, wherein the case main body includes a discharge port discharging the toner, and

the rib is inclined to the discharge port side toward a downstream side in the rotation direction.

13. The image forming apparatus according to claim **10**, wherein an upstream end part of the rib in the rotation direction is provided with a guide part, and protruded height of the guide part from the inner surface of the case main body gets smaller toward an upstream side in the rotation direction.

14. The image forming apparatus according to claim **10**, wherein the toner case further includes an attachment member rotatably supported by the case main body, and

the agitating member is configured to be attached to the attachment member and rotate together with the attachment member.

15. The image forming apparatus according to claim **10**, wherein the agitating member is made of a synthetic resin film, and has flexibility.

16. The image forming apparatus according to claim **10**, wherein a width of the slit is larger than a width of the rib.

17. The image forming apparatus according to claim **10**, wherein the slit extends from one end part of the agitating member in a width direction to one side part opposite to the one end part of the agitating member in the width direction.

18. The image forming apparatus according to claim **10**, wherein the toner case further includes a conveying member rotatably supported by the case main body, and

the case main body includes:

a discharge duct part in which the conveying member is housed; and

a toner containing part on which the agitating member frictionally slides, and

the rib is provided on the toner containing part.

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